

## **A Ce-Nd-Hf isotopes perspective on the EMI-EMII end-members distinction**

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Oceanic Islands Basalts (OIB) provide good means to access the mantle composition. Multi-isotopic studies of OIB have shown large variations at local (island- and/or archipelago scales) and global scales that lead to the definition of several mantle end-members, termed DMM, HIMU, EMI and EMII.

Although the existence of these end-members is now accepted, no consensus has been reached about their exact nature. For example, EM-like signatures are generally thought to be inherited from the recycling via subduction of either pelagic or terrigenous sediments in the mantle source of OIB, while alternative models rather suggest a dominant impact of the subduction of oceanic plates or delamination of sub-continental materials.

The Lanthanum-Cerium (La-Ce) isotopic systematics relies on the radioactive decay of the long-lived <sup>138</sup>La isotope to the radiogenic <sup>138</sup>Ce (half-life of 292.5 Gyr). Cerium is well-known for its change of valence from Ce<sup>3+</sup> to Ce<sup>4+</sup> under oxidized conditions. Such a behavior results in Ce elemental anomalies in pelagic sediments that increase their La/Ce ratio and consequently the long-term evolution of their Ce isotopic composition compared to that of continental-derived material.

Here we present the first Ce isotope analyzes together with new Sr-Nd-Pb-Hf data for samples from the Samoa archipelago (EMII-like OIB) and compare them with those of EMI-like basalts from Gough [1] and Heard Islands [2]. Results show no distinction between Samoa and Heard for which Ce-Nd-Hf isotopic compositions cover most of the mantle array. In contrast, Gough displays a similar range of Ce isotopic compositions but with a restricted field for Nd and Hf isotopes. Although the EMI-EMII distinction is well established in classical, Sr-Nd-Pb isotope variation diagrams, Ce ratios may provide new perspectives on the nature of the materials involved in these OIB sources.

[1] Boyet et al. (2019) *G-cubed* **20** ; [2] Israel et al. (2020) *EPSL* **530**, 115941